

## Abstract

An improved speech model and methods for estimating the model parameters, synthesizing speech from the parameters, and quantizing the parameters are disclosed. The improved speech model allows a time and frequency dependent mixture of quasi-periodic, noise-like, and pulse-like signals. For pulsed parameter estimation, an error criterion with reduced sensitivity to time shifts is used to reduce computation and improve performance. Pulsed parameter estimation performance is further improved using the estimated voiced strength parameter to reduce the weighting of frequency bands which are strongly voiced when estimating the pulsed parameters. The voiced, unvoiced, and pulsed strength parameters are quantized using a weighted vector quantization method using a novel error criterion for obtaining high quality quantization. The fundamental frequency and pulse position parameters are efficiently quantized based on the quantized strength parameters. These methods are useful for high quality speech coding and reproduction at various bit rates for applications such as satellite voice communication.